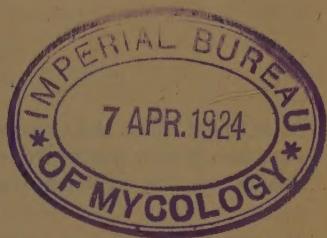




DEPARTMENT OF AGRICULTURE

BULLETIN No. 121.



MILDEW, SEPTORIA, LEAF SPOTS AND SIMILAR DISEASES OF CEREALS,

by

W. M. Carne, Botanist and Plant Pathologist,

and

J. G. C. Campbell, B.Sc., Assistant.

PERTH:

BY AUTHORITY: FRED. WM. SIMPSON, GOVERNMENT PRINTER.

1924.

MILDEW, SEPTORIA, LEAF SPOTS AND SIMILAR DISEASES OF CEREALS.

By W. M. CARNE, Botanist and Plant Pathologist,
and
J. G. C. CAMPBELL.

MILDEW OF CEREALS.

(*Erysiphe graminis.*)

Mildew attacks all the cereals as well as many grasses, but as in black stem rust the fungus has developed specialised races, one attacking wheat, another barley, another rye and so on, so that the form attacking wheat will not attack oats, etc.

Symptoms.—Mildew is a winter or early spring disease, and is prevalent in wet seasons and in damp places and especially on rankly growing crops.

The disease is first noticed forming white or pinkish-white patches on the leaves, and, less frequently, the stems. The affected parts later turn reddish-grey and die.

Some varieties of wheat, as Federation, are very susceptible to attack. Barley and oat are more frequently attacked than wheat.

Life History of the Fungus.—The disease has its origin in resting spores (seed bodies) which have remained in the soil from the previous season. These germinate under favourable conditions and produce branching threads which attack suitable plants if present. The threads (hyphae) grow over the surfaces of the leaves, etc., forming patches of mildew, giving off suckers which penetrate the plant to obtain food.

As the fungus develops, erect bead-like strings of spores (conidia) grow from the patches of mildew. These break up into individual spores which, if blown or carried on to other leaves, will germinate and produce new infections. As the weather becomes warmer the mildew turns to a dirty grey colour. In it are then found small brown or black specks which are the protective cases of the resting spores. Each spore case contains a number of sacs (asci) each containing in its turn eight resting spores. It is through these that infection is carried from season to season. Later in the season the disease usually disappears, the affected parts dying, and the fungus passing into the resting spore stage.

In this fungus, which is one of the group known as "powdery mildews" the fungus threads live outside the attacked plant. In most parasitic fungi the threads are found within the tissues of the host.

Control.—Mildew can flourish only under damp conditions and on rankly growing crops. In Western Australia the disease is usually confined to the lower leaves for a short period during the wettest part of the winter.

Heavy rank crops should be fed off so as to admit sunshine and air, which will quickly check the fungus.

The disease is much less important than would appear at first sight. Under our usual conditions of bright sunny days it is rarely, if ever, of serious consequence in the Wheat Belt.

SEPTORIA OF WHEAT AND RYE.

(Septoria nodorum.)

This disease is also known as **Dry Blight** and **Glume Blotch**. It results from the attack of a parasitic fungus known as *Septoria nodorum*.

Symptoms.—Spots may appear on the leaves, especially the leaf sheaths, on the nodes or joints of the stem, and on the glumes or chaff of the ears. The node attack is the most serious, as these portions become killed, turn dark in colour and rot, which naturally results in the premature death of the stems. The affected spots, if examined with a magnifying glass will be found covered with small black spots—the spore or seed cases of the fungus.

As a result of a bad attack plants are weakened, ripen prematurely, and the grain, if formed, may be small and shrivelled. The grain may also be discoloured and dark, especially at the tips.

Unlike other septoria diseases, this disease does not usually appear until the plants are heading. It is usually serious only in mild moist seasons on early sown crops. Late maturing crops are less liable to be attacked as the parasite appears to lose vigour as the weather becomes drier and warmer. It is more common in the Northern and Southern Districts than in the Eastern Wheat Belt.

It is frequently associated with the effects due to crops heading out of season (see page 5). This may be the principal cause of crops failing to form grain in many cases in which Septoria is blamed.

Infection.—Infection takes place from the spores or seed bodies of the fungus. These are formed in the minute black specks which appear on affected plants. The spores on the stubble and in the soil lie dormant until the following spring. Then, with suitable conditions, they germinate and attack any wheat plants which may be available to them. There is no evidence that infection is carried over by seed.

Control.—As oats are not attacked, the use of rotations, including clean fallows and oats (or other crops not attacked, such as peas) will largely control the disease. The spores are, however, easily blown about, and infection may occur from other paddocks. As the principle involved in the control of diseases such as this and take-all consists in starving the fungi and at the same time providing good conditions for crops so that they may grow strongly and resist disease, good clean farming must be practised. This is well called “crop sanitation.” Such will require the burning of the stubble of badly affected crops to kill as many spores as possible; rotations; clean fallows to keep down volunteer wheat plants and conserve moisture; a good seedbed for the crops; seasonable sowing; and the reasonable use of fertilisers.

Crop sanitation means good farming.

BLACK MOULDS.

(Mycosphaerella Tulasnei and Alternaria spp.)

This name is applied to the dark mouldy fungi which may appear on any of the cereals. They form dark velvety spots on the leaves, stems or ears. When on the ears they may be mistaken for Septoria, but the rotting of the nodes seen in that disease does not occur.

These fungi usually appear on maturing or mature crops during moist weather, and especially on crops which have become lodged. It is probable that they are only weak parasites and of little consequence. Usually they live upon dead plants.

LEAF SPOTS OF CEREALS.

Leaf Spots of Wheat and Rye (Septoria tritici and S. graminum).

Leaf Spot of Bar'ey and Barley Grass (Septoria passerinii).

Leaf Spot of Oats (Leptosphaeria avenaria = Septoria avenae.)

These are minor diseases caused by fungi related to that causing the Septoria disease. The damage resulting is usually so slight as to be overlooked.

Leaf Spot on wheat is extremely common. It thrives best under cool moist conditions, appearing earlier than Septoria and becomes of little consequence as the weather becomes warmer and the plants approach maturity.

These diseases are indicated by yellow or brown spots or streaks on green leaves, and dark grey or black ones on mature straw. The spots are covered with minute black specks which are the protective coverings of the spores.

The usual effects are the yellowing and premature death of the lower leaves. Occasionally seedlings may be severely checked, but even these usually throw off the effects of the disease and recover.

These diseases in Western Australia do not cause sufficient trouble to warrant any special control measures.

STRIPE DISEASE OF BARLEY AND BARLEY GRASS.

(*Helminthosporium gramineum.*)

This may be recognised by straw-coloured spots on the leaves which extend until they form stripes. The leaves eventually turn brown and die prematurely. In severe attacks the plants may be stunted and even die, the heads may be small with the beard twisted and bent and the grain shrivelled. The twisting of the awns is due to the death of the upper leaf sheaths, from which they emerge with difficulty. In some cases whole heads may be unable to get free.

Fortunately there is no evidence that this disease is of any great consequence in this State.

Infection is from spores in the soil and from spores blown on to the plants by the wind, or carried on the seed. The pickling of seed in formalin or bluestone is said to be effective in America. Good farming and crop sanitation are probably sufficient to keep the disease in check in this State.

HEADING OUT OF SEASON.

Crops, especially wheat, flowering out of season may set little or no grain.

In the grain areas of this State wheat for grain should not be in ear before the latter end of August. Crops heading before this time are liable to meet unsuitable conditions, of which rain and frost are probably the most serious. The pollen of the exposed parts of the ears may be affected and grain not formed in consequence. The lower portions of the ears, if protected by the leaf sheaths, may set grain normally. Even in the absence of severe frosts, out of season conditions are not conducive to the development of well-filled ears.

Premature heading results usually from the sowing of quick-maturing varieties too early. Feeding off early sown crops holds them back and at the same time provides useful early feed. Crops which head too soon and promise to be poorly filled may be cut for hay as early as August, and there is always a chance of a second growth, under favourable conditions, which may yield sufficient grain to justify stripping.

Premature heading is frequently associated with the presence of Septoria. It is probable that the conditions which are unfavourable to the wheat plant aid the fungus.

DROUGHT.

Under some conditions lack of moisture may produce a stunting and premature ripening of the plants and a discolouration of the nodes which may be mistaken for Septoria or Take-all. This occurs particularly when an early wet season starting a vigorous growth in the crop is followed by a long dry spell before the plants are full grown. In low lying places, and especially in heavy soil, the ground may become so compacted as to dry out rapidly during the dry period. On light sandy soils drying out may also occur, but the growth is less likely to be so sappy and vigorous. The succulent growth suffers and a shrinking and browning of the nodes may result. Shallow rooting due to the plentiful supplies of moisture during early growth, may result in the death of many of the roots as a consequence of the soil drying and compacting. If the dryness continues the plants may ripen with little or no grain. If late rains come the plants frequently throw out new roots from the lower nodes but may be too far gone to recover.

The nodes and ears being the most delicate parts of the stem suffer first. The weakened plants become an easy prey to the Black Moulds which contribute to a poor crop.

DISEASE AND YIELD.

In general, yields are more influenced by soil, weather, choice of variety, and methods of farming than by disease. Explanation of bad results should not be sought in diseases, except when their results are obvious, unless the farmer is satisfied that his own work, his soil and the weather are not responsible.